

CLAIMS

1. A pre-formation apparatus comprising: a film feeder (62) for supplying a printed film (4) to a pre-forming section (F) where a pre-formation is performed; an upper and a lower clamp members (68i, 68j) for sandwiching the printed film in the pre-forming section (F), and having a through hole (68a); a heater (70) movable to and away from the pre-forming section (F) for heating to plasticize the printed film sandwiched by the upper and lower clamp members (68i, 68j) in the pre-forming section before the pre-formation; pre-forming molds (80, 89) movable to and away from the pre-forming section for pre-forming the printed film (4) via the through hole (68a); and a film die punch (91) for punching the printed film (4) after the pre-formation; wherein the pre-forming molds (80, 89) includes a male mold (81c) for contacting the plasticized printed film and a female mold (89a) to mate with the male mold for a vacuum formation, the pre-formation apparatus further comprising a pitch detecting section (68n') facing the pre-forming section (F), within a pitch (W) of the printed film (4) in a film flow direction (X) for detection of a film mark (M1).
2. The pre-formation apparatus according to Claim 1, wherein the pitch detecting section (68n') is disposed at a center of the width of pitch (W).

3. The pre-formation apparatus according to Claim 1 or 2, wherein the pitch detecting section (68n') has at least its vertical position fixed with respect to a pair of rollers (64, 65a) which support the printed film (4) in the pre-forming section (F).

4. The pre-formation apparatus according to Claim 1 or 2, wherein the lower clamp member (68i) has at least its vertical position fixed with respect to a pair of rollers (64, 65a) which support the printed film (4) in the pre-forming section (F), the pitch detecting section (68n') being virtually fixed to the lower clamp member (68i).

5. The pre-formation apparatus according to Claim 4, wherein the upper clamp member (68j) is formed with a slit (68p) for housing the pitch detecting section (68n').

6. The pre-formation apparatus according to one of Claims 1 through 5, further comprising: meandering detection sections (68m') between the pre-forming section (F) and the pair of rollers (64, 65a) which support the printed film (4) for detecting a meandering prevention line printed on the printed film; and a meandering prevention device controlled by this second detection section as part of the film feeder.

7. The pre-formation apparatus according to Claim 6,

wherein the upper and lower clamp members (68i, 68j) generally cover a region of the printed film (4) exposed to the meandering detection sections 68m' along a film flowing direction (X).

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8. The pre-formation apparatus according to Claim 6 or 7, wherein the heater (70) does not face the region of the printed film (4) exposed to the meandering detection sections 68m' along a film flowing direction (X).

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9. The pre-formation apparatus according to one of Claims 6 through 8, wherein the meandering detection section (68m') is provided on two sides of the printed film (4) with respect to a film widthwise direction (Y).

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10. A pre-formation method using the pre-formation apparatus according to one of Claims 1 through 9, the method comprising: a step of causing the film feeder (62) to supply the printed film (4) to the pre-forming section (F) where a pre-formation is performed; a step of stopping the film supply through detection of the film mark (M1) by the pitch detecting section (68n') within the pitch (W) in the film flowing direction (X) of the printed film (4); a step of causing the upper and a lower clamp members (68i, 68j) to sandwich a margin around a formation region of the printed film (4); a step of moving a heater (70) close to the pre-forming section (F) and heating to plasticize the printed film; a step of performing the pre-formation using

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the pre-forming molds (80, 89); and a step of punching the pre-formed film for making a formation film (5) for insertion into the main mold.

5 11. A main formation method using the pre-formation apparatus according to one of Claims 1 through 9, the method comprising: a step of causing the film feeder (62) for supplying a printed film (4) to a pre-forming section (F) for a pre-formation; a step of stopping the film supply
10 through detection of the film mark (M1) by the pitch detecting section (68n') within the pitch (W) in a film flowing direction (X) of the printed film (4); a step of causing the upper and a lower clamp members (68i, 68j) to sandwich a margin around a formation region of the printed
15 film (4); a step of moving a heater (70) close to the pre-forming section (F) and heating to plasticize the printed film; a step of performing a pre-formation using the pre-forming molds (80, 89); a step of punching the pre-formed film for making a formation film (5) for
20 insertion into the main mold; and a step of supplying resin to the main mold after inserting the formation film (5).

12. A printed film for use in the pre-formation apparatus according to one of Claims 1 through 9, provided with: a
25 film mark (M1) at a center of a pitch (W) in a film flow direction (X), and a meandering prevention line (M3).